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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,180	09/09/2003	Kazuo Nakatani	031054	1678

23850 7590 05/18/2004

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP  
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SUITE 1000  
WASHINGTON, DC 20006

EXAMINER

ZEC, FILIP

ART UNIT	PAPER NUMBER
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3744

DATE MAILED: 05/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/657,180		NAKATANI ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Filip Zec		3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Transcritical CO<sub>2</sub> Cycle Technology" 2002 SAE Automotive Alternate Refrigerant Systems Symposium, July 2002, pages 1-17 by Joo Seok Baek, et al., in view of U.S. Patent 6,612,117 to Kasmer. Baek discloses applicant's basic inventive concept, a refrigeration cycle employing a CO<sub>2</sub> refrigerant with an expander connected to the compressor, an outdoor heat exchanger and an indoor heat exchanger, substantially as claimed with the exception of stating the injection of the high-pressure refrigerant at a halfway point inside of the expander. Kasmer shows this feature to be old in the refrigeration art (col 5, lines 13-28). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made from the teaching of Kasmer to modify the system of Baek, by adding an injection port to the expander in order to serve as a motor/expander which volumetrically increases the chamber resulting in a rarified gas refrigerant exiting the outlet of the expander at low pressure and temperature (col 5, lines 13-28).

3. Claims 2-6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Transcritical CO<sub>2</sub> Cycle Technology" 2002 SAE Automotive Alternate Refrigerant Systems Symposium, July 2002, pages 1-17 by Joo Seok Baek, et al., in view of U.S. Patent 6,612,117 to Kasmer as applied to claim 1 above, and further in view of U.S. Application 10/655020 to

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Hiwata. Baek in view of Kasmer discloses applicant's basic inventive concept, a refrigeration cycle employing a CO<sub>2</sub> refrigerant with an expander connected to the compressor, an outdoor heat exchanger, an indoor heat exchanger and the injection of the high-pressure refrigerant at a halfway point inside of the expander, substantially as claimed with the exception of stating the use of the adjustment valve inside of the injection circuit, the sub-expander at the refrigerant inflow and outflow side, the use of a four-way valve to control the discharge and suction side of the compressor, a second compressor and the use of an electric generator. Hiwata shows these features to be old in the refrigeration art (FIG.s 1, 2 and 6-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made from the teaching of Hiwata to modify the system of Baek, in view of Kasmer, by adding the adjustment valve inside of the injection circuit, the sub-expander at the refrigerant inflow and outflow side, the use of a four-way valve to control the discharge and suction side of the compressor, a second compressor and the use of an electric generator in order to maximize the productivity of the invention.

### ***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,343,482 to Endo, Takeshi et al.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Filip Zec whose telephone number is (703) 306-3446. The

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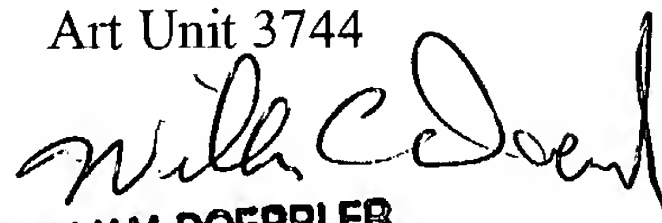
examiner can normally be reached on Monday through Friday, with the exception of every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise Esquivel can be reached on (703) 308-2597. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FZ

Filip Zec  
Examiner  
Art Unit 3744

  
WILLIAM DOERRLER  
PATENT EXAMINER  
GROUP 3400